REMARKS

In the last Office Action, the Examiner objected to the drawings because Fig. 2 lacks a "Prior Art" legend and elements 16 and 60 shown in Fig. 1 are not mentioned in the specification. Claim 13 was objected to based on a minor informality, and the title of the invention was objected to as failing to be adequately descriptive.

Claims 1, 5, 8-10, 12, 16 and 21 were rejected under 35 U.S.C. §102(b) as being anticipated by Ernst. Claims 1, 3, 4, 9, 10, 12, 16, 17, 19 and 20 were rejected under 35 U.S.C. §102(b) as being anticipated by Nomura. Claims 1, 2, 7, 10, 11 and 18 were rejected under 35 U.S.C. §102(b) as being anticipated by Nakamura. Claims 2 and 18 were rejected under 35 U.S.C. §103(a) as being unpatentable over either Ernst or Nomura. Claim 6 was rejected under 35 U.S.C. §103(a) as being unpatentable over Nomura in view of Maruyama. Claims 13-15 were rejected under 35 U.S.C. §103(a) as being unpatentable over Nomura in view of Tsukimoto.

By the present response, independent claims 1 and 10 have been amended to more particularly point out and distinctly claim the novel characteristics of the claimed invention. Claim 13 has been amended to correct the informality noted by the Examiner. A replacement sheet of Fig. 2 has been submitted to add a "Prior Art" legend. The

title of the invention has been replaced by a new title which is more descriptive of the invention to which the claims are directed. New claims 22-31 have been added to provide a fuller scope of coverage.

With respect to the drawing objection based on reference numerals 16 and 60, applicants respectfully submit that such reference numerals are shown in the drawings at Figs. 3 and 7 (reference numeral 16) and Fig. 4 (reference numeral 60). The specification mentions the reference numerals when describing each of those drawings. Thus, applicants respectfully request withdrawal of the drawing objection.

Applicants respectfully submit that claims 1-31 patentably distinguish over the prior art of record.

As described by applicants at pages 1-3 of the specification, in order to achieve accurate positioning of movable members in electronic devices, the position of the movable members is controlled based on feedback control. For instance, a disc-shaped readable member having slits therein is provided to indicate the position of the movable members. The position of the readable member is detected by a position detecting device which projects light through the slits, and the driving force of a driving actuator is controlled to eliminate offsets.

However, when the readable member and the movable members are attached to a rotating shaft, for instance, through holes formed in the readable and movable members, the positional relationship of slits in the readable member can be shifted in a peripheral direction. When the positional relationship is shifted, it is difficult to detect the absolute position of the movable members. As a result, even if movement of the movable members is accurately determined based on the detected position of the readable member, the absolute position of the movable member is shifted. The amount of such shift between the slits and the movable members differs in the same products as a result of manufacturing errors.

In order to eliminate the shift in positional relationship between the slits and the movable members, the positional relationship between a slit and the movable members must be adjusted. Such adjustment is typically carried out during manufacture and requires additional time and burden, resulting in an increase in fabrication cost.

The present invention eliminates any deviation in a the positional relationship in a peripheral direction between a readable member and a movable member when the member to be read and the movable member are attached to a moving member such as a rotating shaft or the like. Thus, adjustment of the

positional relationship during the manufacturing process can be eliminated.

In accordance with one aspect of the present invention recited by amended independent claim 1, the inventive electronic apparatus comprises a movable member movably driven to perform a given function, a position detecting device for detecting the position of the movable member, an actuator having a moving member movably driven to drive the movable member, a readable member for providing location information of the movable member, and a guide member for maintaining a fixed relative orientation between the movable member and the readable member by permitting assembly of the movable member and the readable member in the electronic apparatus in only one way by which the relative orientation is fixed by the assembly, to thereby avoid the need for manual adjustment of the relative orientation after assembly. Amended independent claim 10 contains similar language.

Newly added independent claims 22 and 23 recite an electronic apparatus having a readable member and a movable member that are configured such that a predefined relative orientation therebetween is obtained by assembly of the readable member and the movable member in the electronic apparatus, to thereby avoid the need for manual adjustment of the relative orientation after assembly.

Accordingly, each of independent claims 1, 10, 22 and 23 recites a readable member and a movable member which are assembled in an electronic apparatus in a way which ensures that a specific relative orientation is achieved therebetween.

By fixing the movable member and the readable member, a shift in the positional relationship between a readable portion (such as a slit) of the readable member and the movable member is eliminated, so that adjustment of relative positions of both members is unnecessary.

In the embodiment illustrated in Fig. 7 of the application drawings, a motor 16 drives a rotating shaft 9 (moving member). A readable member 2 is attached to the rotating shaft 9 and an indicator 27 (movable member) is also attached to the rotating shaft 9. A guide member 9a having a semi-circular portion is formed integrally with the rotating shaft 9 to allow assembly of the readable member 2 and the indicator 27 in only one way, namely, through semi-circular through-holes therein. The use of a semi-circular guide and through-holes ensures that a predefined relative orientation is achieved and prevents relative rotation of the various elements. In addition, a light emitting element 8a and a light receiving element 8b sandwich the readable member 2.

No corresponding structure is disclosed or suggested by the prior art of record.

The Examiner relied on Ernst, Nomura and Nakamura as disclosing various elements that hold a readable member and a movable member in a given orientation. Applicants acknowledge the prior art existence of such elements.

However, as noted above, amended independent claims 1 and 10, and newly added independent claims 22 and 23, require that the readable member and movable member are arranged with a predefined relative orientation as a result of their assembly. Claims 1 and 10 recite that a guide member that permits assembly of the movable member and the readable member in the electronic apparatus in only one way by which the relative orientation is fixed by the assembly, to thereby avoid the need for manual adjustment of the relative orientation after assembly. Claims 22 and 23 require that the readable member and the movable member are configured such that a predefined relative orientation therebetween is obtained by assembly of the readable member.

The devices disclosed by the cited references lack the above-noted structure requirements recited by the amended and newly added independent claims. Ernst discloses an incremental angle encoder having a movable member S2a, a position detecting device (B2a, RP2a) for detecting the

position of the movable member, a motor having gears, a readable member S1a, and a guide member (shaft) W1a for holding the movable member, the actuator and the readable member in a fixed orientation. However, the shaft does not allow assembly of the readable member and the movable member in only one way so that a desired relative orientation of therebetween is achieved by the assembly process and manual adjustment is not needed.

Similarly, Nomura discloses a sensor encoder having a movable member 59a, a position detecting device 57a, an actuator 30, a readable member 59b, and a guide member (shaft) A. The shaft does not allow assembly of the readable member and the movable member in only one way.

Likewise, Nakamura fails to disclose or suggest the claimed guide member or configuration recited by claims 1, 10, 22 and 23. Furthermore, neither Maruyama nor Tsukimoto discloses the claimed structure.

Accordingly, applicants respectfully submit that independent claims 1, 10, 22 and 23, and all claims depending therefrom, patentably distinguish over the prior art of record.

Independent claim 32 recites an electronic apparatus having a motor, a disc-shaped readable member rotary driven by the motor and having at least one first slit therein and an

optical amount adjusting slit having an arcuate shape with a radius of curvature identical to that of a rotational path of the readable member, and having a width that tapers along the arcuate shape thereof, and a detecting device for detecting rotation of the readable member and having a light emitting element and a light receiving element sandwiching the readable member so that light is projected through the at least one first slit once for each revolution of the readable member.

None of the cited references discloses or suggests a readable member having a slit with the claimed characteristics.

Accordingly, applicants respectfully submit that all of claims 1-32 patentably distinguish over the prior art of record, and that the rejections under 35 U.S.C. §102(b) and §103(a) should be withdrawn.

In view of the foregoing amendments and discussion, the application is now believed to be in condition for allowance. Accordingly, favorable reconsideration and allowance of the claims are most respectfully requested.

Respectfully submitted,

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